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FM3

32-BIT MICROCONTROLLER
FM3 Family

Virtual Starter Kit

USER MANUAL

SPANSION®

For the information for microcontroller supports, see the following web site.

http://www.spansion.com/support/microcontrollers/

Publication Number FM3_MN706-00044 Revision 1.0 Issue Date July 18, 2014

Preface

Thank you for your continued use of Spansion products.

Please read this document, this product series 'Data Sheet' and 'FM3 family Peripheral manual' before using Virtual Starter Kit (VSK) package.

This document purpose and target reader

The document explains about VSK package function, behavior and how to use for engineers who develop products using this package.

Note:
This manual only explains about package/simulator function and behavior. This manual does not include the explanation about product series function and specification.
You could refer to this product series 'Data Sheet' or 'FM3 family Peripheral manual' for series function and specification details.

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ARM and Cortex are the registered trademarks of ARM Limited in the EU and other countries.

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Sample program and development environment

Spansion offers sample programs free of charge for using the peripheral functions of the FM3 family. Spansion also makes available descriptions of the development environment required for this family. Feel free to use them to verify the operational specifications and usage of this Spansion microcontroller.

- Microcontroller support information
  http://www.spansion.com/Products/microcontrollers/32-bit-ARM-Core/fm3/Pages/overview_32fm3.aspx

Note:
The sample program is subject to be changed without notice. And the sample program's behavior and the way to use are only for standard case. Please make sure to test the sample program on your system before using the program.
Our company does not have any responsibility for any problem happening on your side when you use this sample program.

This document composition

Virtual Starter Kit user manual consists of following chapter.

CHAPTER1: Virtual Starter Kit
CHAPTER2: Simulator Function Specification

CHAPTER3: External Device
CHAPTER4: Run Simulation
CHAPTER5: Simulation Data Analyzing

Related manual

The manuals related to VSK are listed below. See the manual appropriate to the applicable conditions.

The contents of these manuals are subject to change without notice. Contact us to check the latest versions available.

FM3 family peripheral manual

Please refer to following document about each peripheral specification details of the product series supported by Virtual Starter Kit.

- FM3 Family PERIPHERAL MANUAL
  (Called "PERIPHERAL MANUAL" hereafter)
- FM3 Family PERIPHERAL MANUAL Timer Part
  (Called "Timer Part" hereafter)
- FM3 Family PERIPHERAL MANUAL Analog Macro Part
  (Called "Analog Macro Part" hereafter)
- FM3 Family PERIPHERAL MANUAL Communication Macro Part
  (Called "Communication Macro Part" hereafter)

FM3 family peripheral manual (MCU SIMULATOR VERSION)

Regard the list of peripherals of the MCU series supported by Virtual Starter Kit, there are differences in specification and behavior between simulator and real device. Please refer to the following document for these differences.

- FM3 Family PERIPHERAL MANUAL MCU SIMULATOR VERSION
  (Called "PERIPHERAL MANUAL MCU SIMULATOR VERSION" hereafter)
- FM3 Family PERIPHERAL MANUAL Timer Part MCU SIMULATOR VERSION
  (Called "Timer Part MCU SIMULATOR VERSION" hereafter)
- FM3 Family PERIPHERAL MANUAL Analog Macro Part MCU SIMULATOR VERSION
  (Called "Analog Macro Part MCU SIMULATOR VERSION" hereafter)
- FM3 Family PERIPHERAL MANUAL Communication Macro Part MCU SIMULATOR VERSION
  (Called "Communication Macro Part MCU SIMULATOR VERSION" hereafter)

Data sheet

Please refer to following document about details of device specification, electrical characteristics, external dimensions and order type.

- Microcontroller 32bit original FM3 family DATA SHEET

Note:
There are data sheet on each series.
Please refer to the data sheet of the product series you use.

Table of Contents

Figures

Tables

CHAPTER1: Virtual Starter Kit

This chapter explains the functions of the Virtual Starter Kit.

---

1. Overview

Virtual Starter Kit is virtual evaluation environment which includes FM3 microcontroller and its external devices. FM3 microcontroller is provided by Spansion Inc (Spansion).

The same with actual machine(board), it is possible to connect IDE debugger to Virtual Starter Kit.

Virtual Starter Kit includes (1)hardware function simulator of FM3 microcontroller products (called “FM3 Simulator” hereafter) and (2)simulator of external devices (called “External Device Model” hereafter) which are controlled by FM3 microcontroller. The user can make these simulators operating together by simple instructions.

With Virtual Starter Kit, the users can conduct software development, test and system evaluation without evaluation board.

Package basic information

- Package Name ：Virtual Starter Kit
- Package Version ：1.00
- Package Type ：Product Package

Hardware requirements

Microsoft Windows 7 version SP1 or later.

Required softwares

Visual C++2010 SP1 redistributable package

- Software ：Visual C++ 2010 SP1 redistributable package（x86）
- Source ：Microsoft

Note：

1. *Microsoft Visual C++ 2010 SP1 redistributable package（x86）is necessary for running application developed in Visual C++ 2010 SP1 when Visual C++ 2010 SP1 is not installed on the computer.*
2. *Microsoft Visual C++ 2010 SP1 redistributable package（x86）is available at Microsoft Corp. Download Center.*

Third party tool library

Virtual Starter Kit includes Open Source Softwares(OSS). OSS are “libcoqemu.dll”, “libgcc_s_dw2-1.dll” and “libz-1.dll”. Please refer to the documents of OSS license in folder of “LICENSE”.

■ QEMU

- Software ：qemu-0.12.5
- Source ：Please contact us by e-mail. dl.vsk-support@spansion.com
- License ：http://wiki.qemu.org/License

Note：

QEMU is provided under GPL license.
It is included in Virtual Starter Kit as built DLL file.
QEMU license include LGPL and BSD.

■ SystemC & TLM2.0

- Software：systemc-2.2.0, TLM-2.0.1

- Source : http://www.systemc.org/downloads/standards/systemc
- License : http://www.systemc.org/about/policies/SystemC_Open_Source_License.pdf

Note:
The URL is subject to be changed by download source.

2. System Structure

Virtual Starter Kit system structure is shown in Figure 1-1 and explanation of each system element is shown in Table 1-1.

Virtual Starter Kit includes FM3 simulator and external device models. Virtual Starter Kit can connect with IDE Software Debugger.

Figure 1-1 Virtual Starter Kit system structure

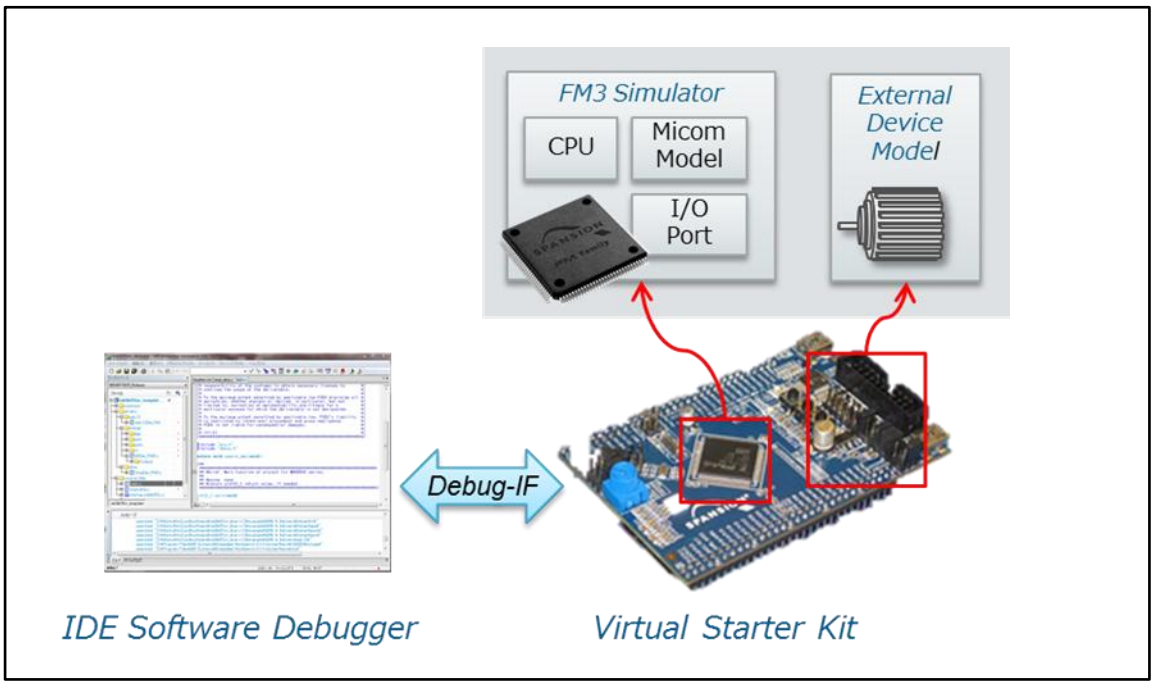


Table 1-1 Virtual Starter Kit composition element

Composition element	Explanation
Virtual Starter Kit	This package. Included FM3 Simulator, External Device Model.
FM3 Simulator	Included FM3 microcontroller model which simulated Cortex-M3 CPU function and FM3 microcontroller hardware function. (*1)
External Device Model	External device model which connect to FM3 Simulator peripheral function.
IDE Software Debugger	Software debugger which connect to Virtual Starter Kit when run FM3 simulator.

*1: FM3 Microcontroller product series which FM3 Simulator supported is different on each package.

3. Included Files

Virtual Starter Kit file structure is as follows.

```
Spansion_VSK_MB9B510R
│   LIMITATION.txt
│   RELEASENOTE.txt
│
├──LICENSE
│   │   LicenseAgreement.rtf
│   │
│   └──opensource
│           BSD_license.txt
│           LGPL_license.txt
│           QEMU_license.txt
│           SystemC_Open_Source_License.pdf
│
├──Manual                          … Folder of Manuals
│       MN706-00044-1v0-E.pdf
│       MN706-00045-1v0-E.pdf
│
└──VirtualStarterKit               … Folder of Virtual Starter Kit Files
    │   VirtualStarterKit.bat      … Virtual Starter Kit Executable File
    │
    ├──binary                      … Folder of FM3 Simulator Executable File
    │   ├──opensource              … Folder of Open Source Software library Files
    │   └──plugin                  … Folder of Virtual Starter Kit's plugin Files
    │
    ├──configuration               … Folder of Virtual Starter Kit's configuration files and definition files
    │   │   cpu.ini                … CPU Configuration File(Refer to sub section 51 for the details.)
    │   │   micom.ini              … MCU Configuration File(Refer to sub section 52 for the details.)
    │   │   micom.xml              … MCU Definition File
    │   │   svcd.ini
    │   │   trace.ini
    │   │   xsi.xml
    │   │
    │   └──plugin                  … Folder of Virtual Starter Kit's plugin configuration and defintion files
    │           analog_input.ini    … Analog Input Congiguration File(Refer to sub section 3-1 for the details.)
    │           analog_input.xml    … Analog Input Definition File
    │           dip_switch.ini      … DIP Switch Configuration File(Refer to sub section 3-2 for the details.)
    │           tactile_switch.ini  … Tactile Switch Configuration File(Refer to sub section 3-3 for the details.)
    │           switch.xml          … Switch Device Definition File
    │           termif_server.ini   … Terminal Connection Configuration File(Refer to sub section 3-4 for the details.)
    │           termif_server.xml   … Terminal Connection Definition File
    │           XSIInit.ini         … Init Device Configuration File
    │           XSIInit.xml         … Init Device Definition File
    │
    └──firmware                    … Folder of Firmware
            mb9bf51xr_pwmout.out
```

CHAPTER2: Simulator Function Specification

This chapter explains the Simulator functions specification.

---

1. Overview

FM3 Simulator is used to simulate hardware functions of FM3 microcontroller provided by Spansion. FM3 microcontroller is 32 bit general-purpose RISC microcontroller, whose CPU is CortexTM-M3 core of ARM Limited.

In FM3 Simulator, QEMU is used as the Instruction set simulator of Cortex-M3. It allows users to conduct a software development with FM3 Simulator as the same with actual machine.

Interface to connect microcontroller function I/O with External device model is also available in FM3 Simulator. It allows the users to run FM3 simulator with external devices connected.

Simulator basic information

Simulator Name : FM3 Simulator MB9B510R series

Version : 1.20

Target Series : MB9B510R series

About FM3 Simulator supporting peripheral function

FM3 Simulator supporting peripheral function is different according to FM3 Simulator objective lineup products and simulator version.

Supported peripheral function is shown at Table 2-1.

Table 2-1 Peripheral function supported in FM3 Simulator

Peripheral function		description
Basic peripheral	Clock	available
	High rate CR timing	available
	Clock monitoring function	restriction of use *1
	Reset	available
	Low voltage detection	available
	Low power consumption mode	not available
	Interrupt	available
	External interrupt・NMI control	available
	DMAC	available
	I/O port	available
	CRC（Cycle Redundancy Check）	available
	External bus interface	restriction of use *2
	Flash memory	restriction of use *2
Timer	Watch dog timer	available
	Dual timer	available
	Watch counter prescaler	available
	Watch counter	available
	Real time clock	not available
	Base timer I/O selector function	available
	Base timer	available
	Multifunction timer	available
	PPG	restriction of use *3
	Quad counter	restriction of use *4
Analog macro	12bit A/D converter	available
	A/D timer trigger selector	available
	10bit D/A converter	not available
	LCD controller	not available
Communicate macro	Multifunction serial(UART)	available
	Multifunction serial (CSIO)	not available
	Multifunction serial (LIN)	not available
	Multifunction serial (I2C)	not available
	USB/Ethernetclock generate	not available
	USB	not available
	Ethernet	not available
	CAN prescaler	not available
	CAN controller	not available
	HDMI-CEC/remote control receive	not available

*1: If the CSV function is enabled, the clock failure is detected when the main clock period or the sub clock period is 0ps. If the FCS function is enabled, the anomalous frequency is detected when the main clock period is 0ps.

*2: External bus interface and Flash Memory register is not supported. It is replaced these area with RAM.

*3: PPG does not support PPG IGBT mode.

*4: Quad Counter does not support Quad Counter position rotation counter display function.

Please refer to other document about peripheral function which you using lineup products.

2. Simulator Behavior

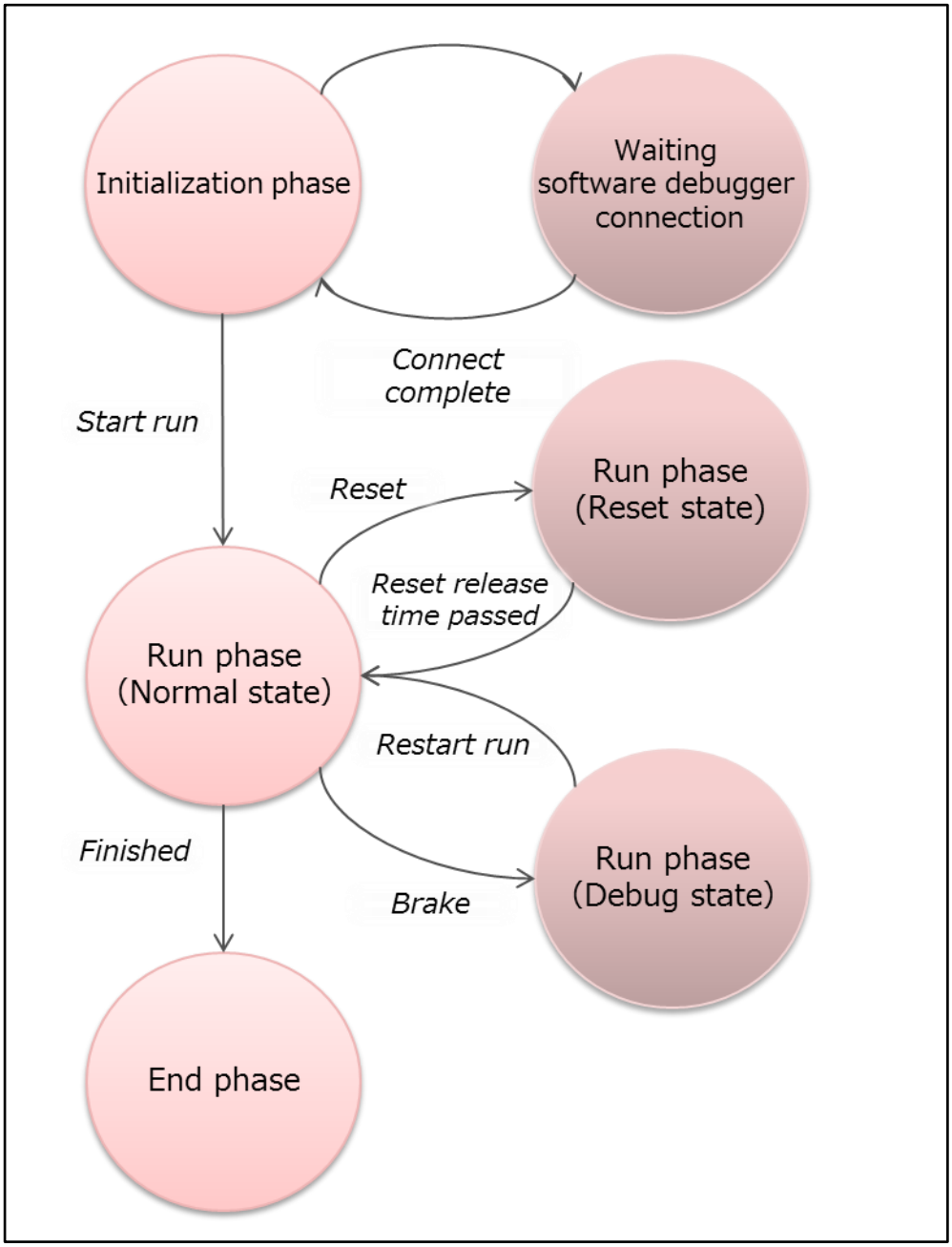
FM3 Simulator start simulation by booting FM3 Simulator main unit.

FM3 Simulator behavior has 3 phases.

- Initialization phase
- Run phase (Reset state /Normal state /Debug state)
- End phase

FM3 Simulator phase and status is shown at Figure 2-1.

Figure 2-1 FM3 Simulator phase and status



Initialization phase

At Initialization phase, CPU function configuration, microcontroller function configuration, setting of external connection interface and Device initialization are done. (CPU function configuration means to load image file which runs simulation)

During FM3 Simulator's Initialization, simulation time keep zero, CPU function and microcontroller function do not run. External input signal from external connection interface can not received by FM3 Simulator.

After FM3 Simulator initializing configuration finishes, FM3 Simulator automatically moves to Run phase.

If software debugger connection configuration is enabled, FM3 Simulator will wait for connection notice from software debugger. After FM3 Simulator connects to software debugger, FM3 Simulator receives a register access from software debugger, then FM3 Simulator move to Run phase.

Run phase

Run phase has 3 states.

- Reset state
- Normal state
- Debug state

Run phase time chart is shown at Figure 2-2 and explaining on each time is shown at Table 2-2.

Figure 2-2 Run phase time chart

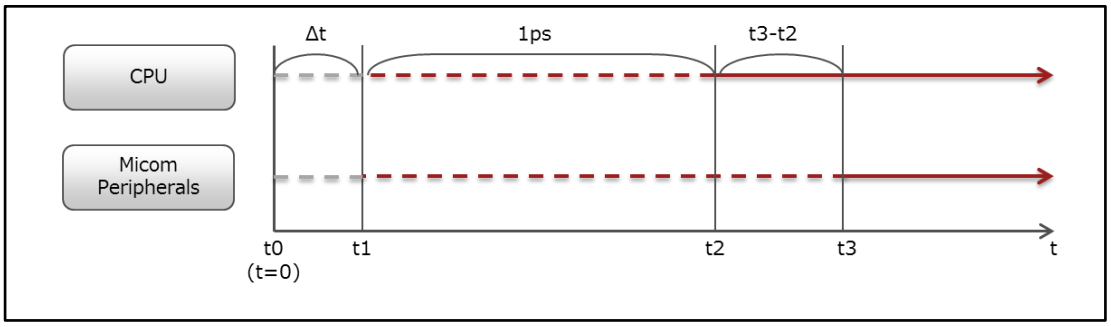


Table 2-2 Each time explanation

Timing	Explanation
t0	Simulation starting time
t1	Power on reset issuing time. t1 is issued Δt time after t0.
t2	Power on reset release issuing time. t2 is issued 1ps later after t1. Program starting time. Peripheral initial setting time to the register.
t3	Between t3 and t2 interval is different depending on software program.

■ Reset state

It is different between simulation start time and program start time because simulation starts after reset releases.

Immediately after moving to Run phase, FM3 Simulator issues power-on reset, then do not run the program. Peripheral function does not run also, even external signal is input to FM3 Simulator.

After 1ps from start simulation, power-on reset is released automatically.

Then program starts and move to Run phase(Normal condition).

■ Normal state

Each peripheral function of FM3 microcontroller starts running after power-on reset is released, and then change to accessible condition from external interface.

In the normal condition, if a system termination signal from simulator console or internal abnormality is detected, FM3 Simulator moves to End phase.

■ Debug state

In the run phase(Normal state), if application of software debugger comes to a break, simulator move to Run phase(Debug state).

In the debug state simulation temporarily stops.

In the debug status, CPU function and microcontroller function do not run, and simulation time doesn't change.

If application of software debugger starts again, simulator moves back to Run phase(Normal state).

End phase

In the End phase, simulation is stops and simulation finishes.

3. CPU

FM3 Simulator uses QEMU as Cortex-M3 CPU function.

QEMU includes Cortex-M3 processer instruction set simulator, nested vectored interrupt controller(NVIC) and SysTick timer function.

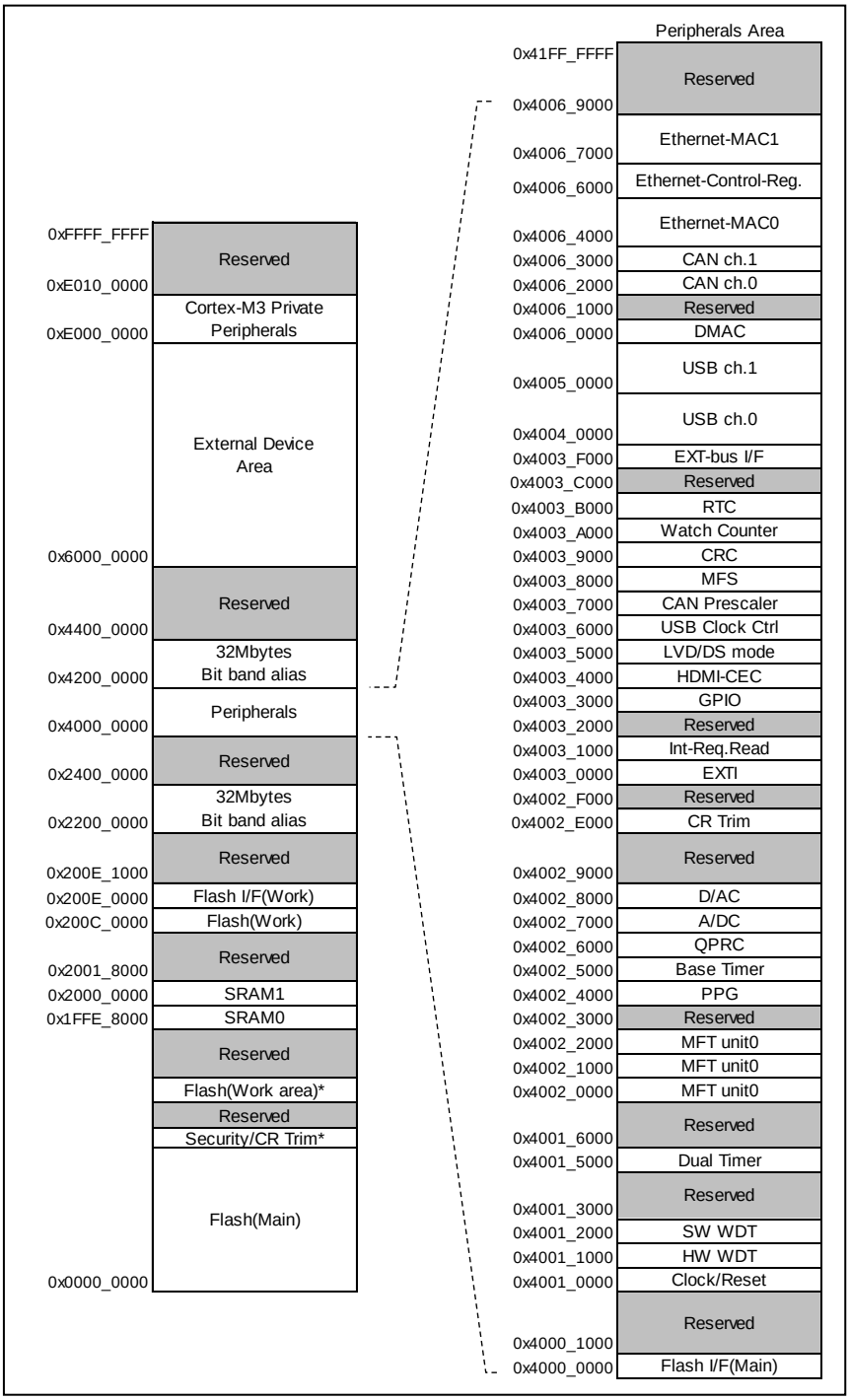
Please refer to web site below about QEMU details.

http://wiki.qemu.org/

4. Memory Map

FM3 Simulator Memory Map is shown at Figure 2-3.

Figure 2-3 FM3 Simulator Memory Map



FM3 Simulator has 4GB addressing memory area the same as actual machine.

Maximum to 1 MB Flash Memory, maximum to 512 KB SRAM1 area, maximum to 512 KB SRAM0 area.

FM3 Simulator has maximum memory size regardless of lineup products.

2 GB of 0x60000000-0xDFFFFFFF area as External bus area, you can connect External memory device to this memory area.

Note:
Not available on Virtual Starter Kit (version of 2014 March).

Some of peripherals are not supported depending on product line up. We replace not supported peripheral area with RAM on FM3 Simulator.

5. Peripheral

Please refer to 'FM3 Family PERIPHERAL MANUAL(MCU SIMULATOR VERSION)' about each peripheral details.

6. External Device Model

Explain about External Device Model.

FM3 Simulator can connect to External device model of respective external device.

Details of Connections between FM3 Simulator’s I/O ports and External Device models are shown at Table 2-3.

Table 2-3 Connections between I/O Ports and External Devices

Included Function	IO Port	External Device Model
Power	VCC	-
Clock	X0	-
	X0A	-
Reset	INITX	-
External interrput・NMI control	INT00-INT07	Tactile Switch
	INT08-INT15	-
	NMIX	-
I/O port	P00-P07	DIP Switch
	P00-P0F	-
	P10-P1F	Tactile Switch
	P20-P2F	-
	P30-P3F	-
	P40-P4F	-
	P50-P5F	-
	P60-P6F	-
	P70-P7F	-
	P80-P8F	-
	P90-P9F	-
	PA0-PAF	-
	PB0-PBF	-
	PC0-PCF	-
	PD0-PDF	-
	PE0-PEF	-
	PF0-PFF	-
External bus interface	EXT_master	-
A/D converter	ADTG0-ADTG2	-
	AN00	Analog Input
	AN01-AN15	-
	AVCC	-
	AVRH	-
	AVSS	-
Base Timer	TIOA0-TIOA7	-
	TIOB0-TIOB7	-
Multifunction Serial	SIN0	termif_server
	SOUT0	termif_server
	SIN1-SIN7	
	SOUT1-SOUT7	
Multifunction Timer	FRCK0-FRCK2	-
	IC00-IC03	-
	IC10-IC13	-
	IC20-IC23	-
	RTO00-RTO05	-
	RTO10-RTO15	-
	RTO20-RTO25	-

Please refer to 'CHAPTER3:External Device' about External Device Model.

7. Debug Interface

FM3 Simulator includes Debug interface to connect to software debugger which supports gdb port.

Software debugger supporting gdb base connection can connect to FM3 Simulator.

About software debugger which supports gdb port

Following software debuggers can connect with FM3 Simulator.

* Please refer to each tool bender website for latest support status.

The following is the latest status in March 2014.

IAR Embedded Workbench

Software ：IAR Embedded Workbench

Source ：IAR Systems

Sourcery Code-Bench

Software ：Sourcery Code-Bench 2011.09.69

Source ：Mentor Graphics Corporation

8. Trace Function

8-1 I/O Trace Function

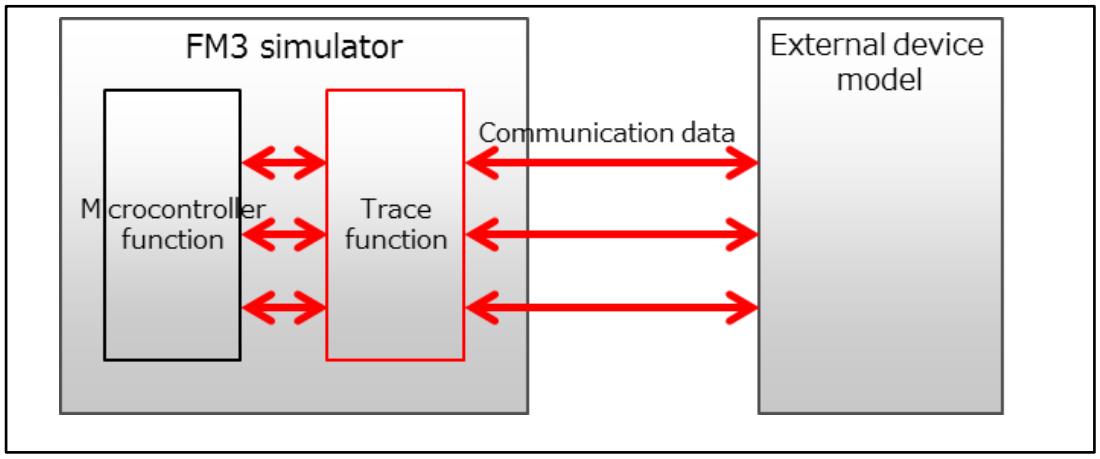
Explain about I/O Trace function.

FM3 Simulator also has I/O trace function to trace the value of a I/O signal.

If you use Trace function you can analyze simulation data.

Trace function schematic view is shown in Figure 2-4.

Figure 2-4 Trace function



Please refer to 'CHAPTER5:Simulation Data Analyzing' about trace function and simulation data analyze details.

CHAPTER3: External Device

This chapter explains the functions of the External Device.

1 : Analog Input Device

2 : DIP Switch Device

3 : Tactile Switch Device

4 : Terminal Connection Device

1. Analog Input Device

Analog input device is a GUI program which provides analog value to FM3 Simulator.

Analog input device specification is shown below.

Port type：Transaction type

Data type：Analog value

Direction(*1)：Input

Channel number：1

Connectable port：A/D Converter(ADC) analog input(ANxx)

*1: Direction(Input/Output) is seen from FM3 Simulator

Analog input device GUI is shown at Figure 3-1 and composition element explanation is shown at Table 3-1.

Figure 3-1 Analog input device GUI

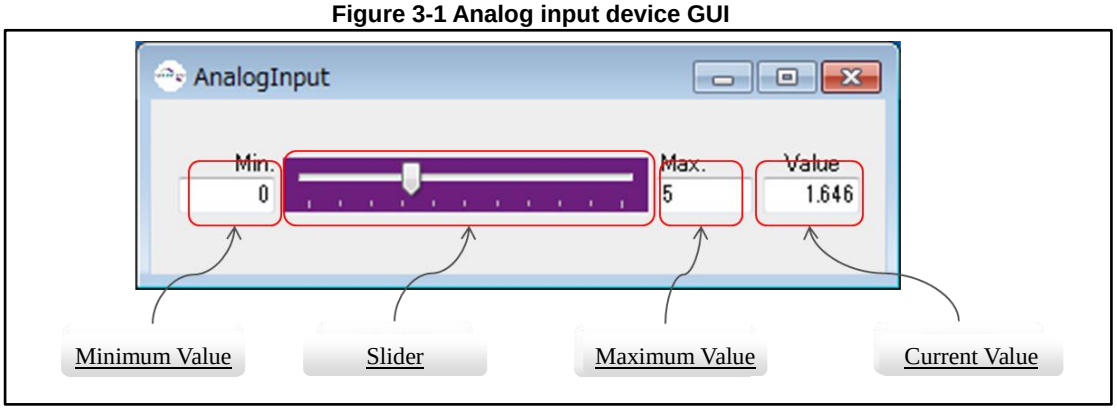


Table 3-1 Analog input device composition element

Composition element	Explanation
Minimum Value	This textbox is showed minimum value and setting minimum value is available. (Default value is 0).
Maximum Value	This textbox is showed maximum value and setting maximum value is available. (Default value is 5).
Current Value	This textbox is showed the analog input value and setting the analog input value is available. (Default is Minimum Value).
Slider	This slider is showed the position of analog input value. Changing the analog input value is available by the bar slide. (Default is Minimum Value).

Function

Setting the analog input value is available by the bar slide. The value unit is Volt.

Also, setting the analog input value is available by set a value to 'Value' textbox.

The value range of analog input bar can be changed by modifying the Min's and Max's value. Enter a value number to 'Min' textbox to change Min value, enter a value number to 'Max' textbox to change Max value.

Maximum value must be bigger than Minimum value.

The characters which are not numeric character can not be accepted. In this case, error message is displayed.

2. DIP Switch Device

DIP switch device is a GUI program which is used to input digital value. The GUI includes 8 switches, each switch is used to input digital value for 1 bit.

DIP switch device specification is shown below.

Port type：Signal type

Data type：1bit digital value

Direction(*1)：Input

Channel number：8

Connectable port(*2)：

General I/O port input(Pxx)

Timer trigger input(TIOAx, TIOBx)

Input capture input(ICx)

External interrupt input(INTxx)

External reset input(INITX)

Non-maskable interrupt(NMIX)

A/D converter trigger input(ADTGx)

*1: Direction (Input/Output) is seen from FM3 Simulator

*2: Connected to general I/O port P00-P07 in this package.

DIP switch device GUI window is shown at Figure 3-2 and composition element explanation is shown at Table 3-2.

Figure 3-2 DIP switch GUI window

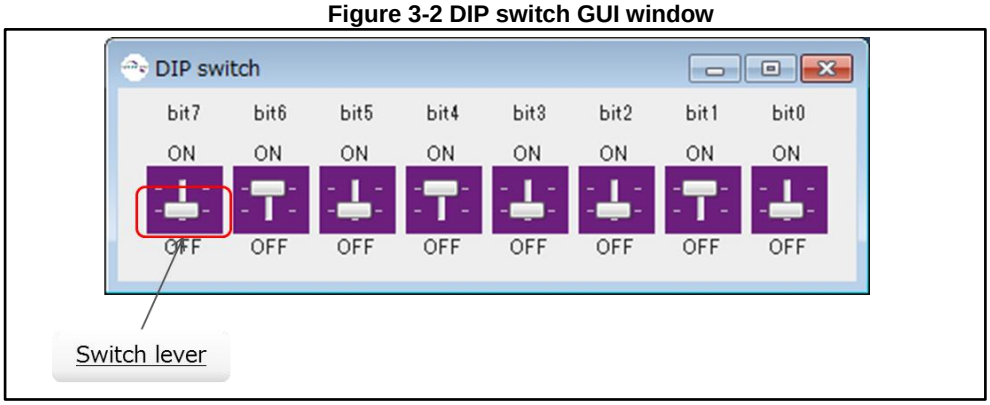


Table 3-2 DIP switch composition element

Composition element	Explanation
Switch lever	1bit digital value input lever (Default is OFF).

Function

Move up the switch lever to switch ON. Move down the switch lever to switch OFF. The switch status is kept until the switch lever moves up or down again. When switch is ON, input value to FM3 Simulator is 1, when switch is OFF, input value to FM3 Simulator is 0.

3. Tactile Switch Device

Tactile switch device is a GUI program which is used to input digital value. The GUI includes 8 switches, each switch is used to input digital value for 1 bit.

Tactile switch device specification is shown below.

Port type：Signal type

Data type：1bit digital value

Direction(*1)：Input

Channel number：8

Connectable port(*2)：

General I/O port input(Pxx)

Timer trigger input(TIOAx, TIOBx)

Input capture input(ICx)

External interrupt input(INTxx)

External reset input(INITX)

Non-maskable interrupt(NMIX)

A/D converter trigger input(ADTGx)

*1: Direction (Input/Output) is seen from FM3 Simulator.

*2: Connected to External interrupt input INT00-INT07 in this package.

Tactile switch device GUI window is shown at Figure 3-3 and composition element explanation is shown at Table 3-3.

Figure 3-3 Tactile switch device GUI window

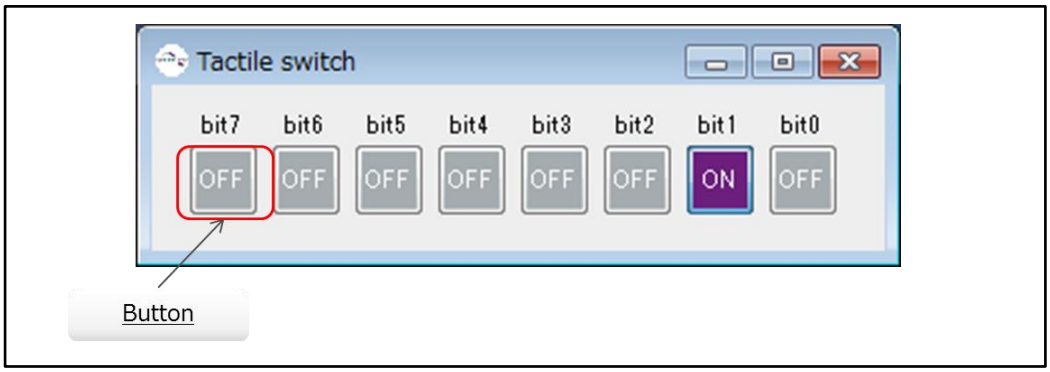


Table 3-3 Tactile switch device composition element

Composition element	Explanation
Button	1bit digital value input lever (Default is OFF).

Function

Move up the switch lever to switch ON. Move down the switch lever to switch OFF. When switch is ON, input value to FM3 Simulator is 1, when switch is OFF, input value to FM3 Simulator is 0.

4. Terminal Connection Device

Terminal connection device is device model which is used to connect FM3 Simulator with a terminal emulator.

Terminal connection device specification is shown below.

Port type：Transaction type

Data type：8bit digital value

Direction(*1)：Input, Output

Channel number：1

Connectable port(*2)：

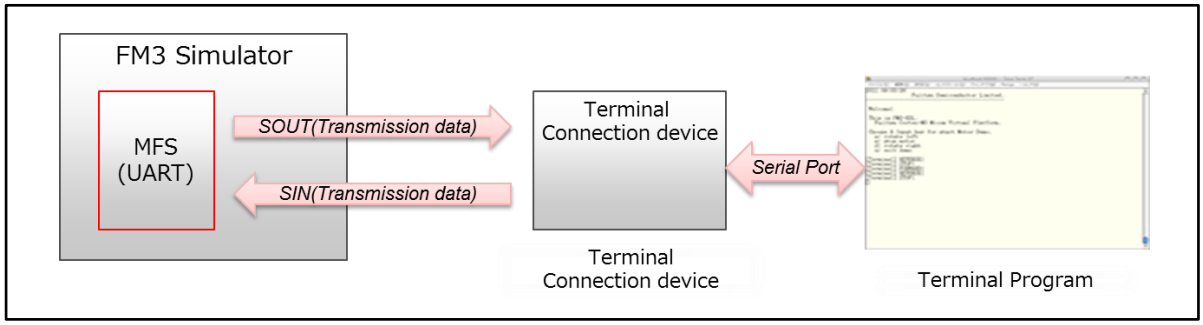
Multifunction serial(UART) serial input(SINx)

Multifunction serial(UART) serial output(SOTx)

*1: Direction (Input/Output) is seen from FM3 Simulator

*2: Connected to serial input SIN0 and serial output SOT0 at Multifunction serial(UART) in this package.

Figure 3-4 Terminal connection device connection figure



Function

Terminal connection device sends data which is received from UART to terminal emulator.

Terminal connection devices send data which is received from terminal emulator to UART byte by byte.

Terminal program behavior (Linefeed code handling, Data transmit unit) depends on the Terminal program configuration.

Note：

1. *Configuration example when using Tera Term Version 4.73.*

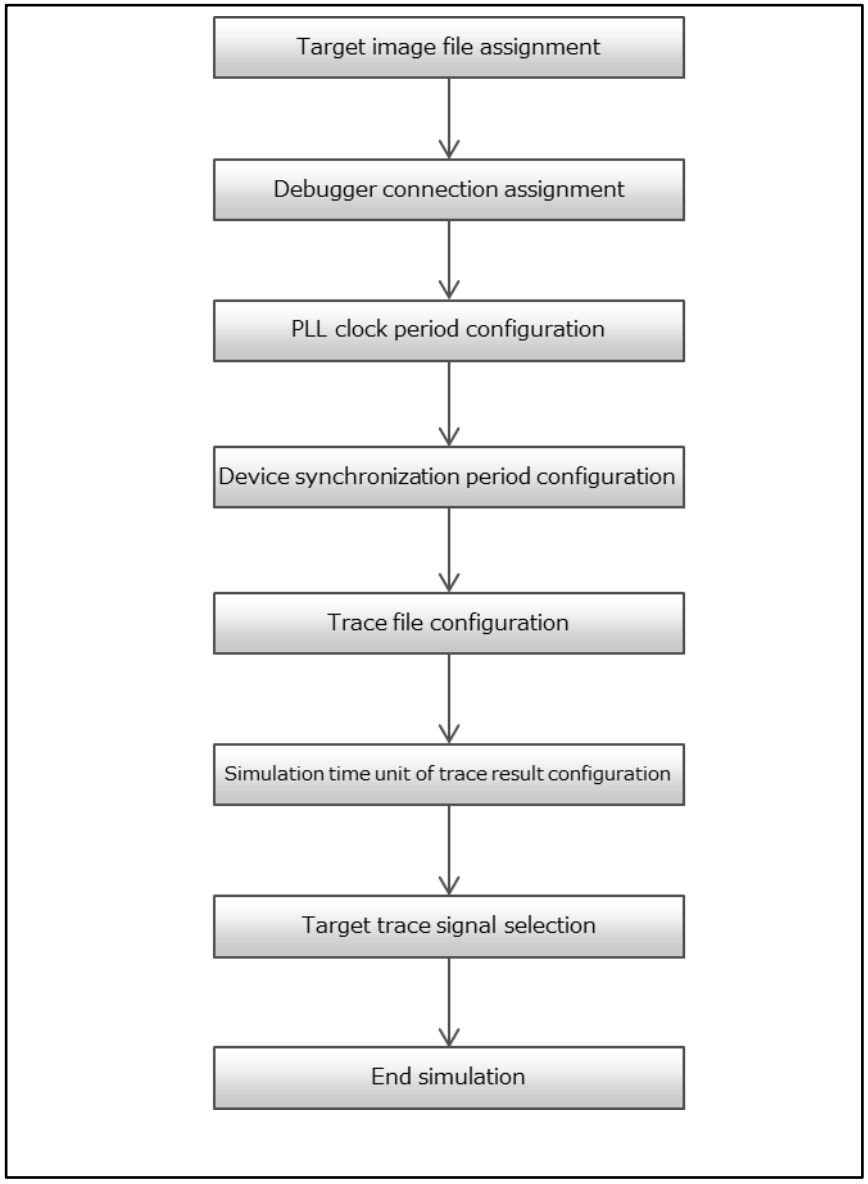
```
Tera Term GUI
        Terminal setup:
                                New-line: Receive: LF, Transmit: CR
                                Local echo: OFF

TERMINAL.ini
                ; Line at a time mode
                EnableLineMode = OFF
```

5. Simulation Run Steps

Simulation run steps flow chart is shown at Figure 3-5.

Figure 3-5 Simulation run steps flow chart



CHAPTER4: Run Simulation

This chapter explains the functions of the Run Simulation.

1.

1. Configurations of CPU Function
2. Configurations of Microcontroller Function
3. Configurations of Device Function
4. Configurations of Trace Function
5. How to Run Simulation

1. Configurations of CPU Function

The CPU function is configured by using CPU configuration file (cpu.ini).

Configurations are shown at Table 4-1.

Table 4-1 Configuration list at CPU function

Option	Entry name	Explanation
Target image file configuration	ELF_FILE	Configuration of file path of FM3 Simulator's image file.
Software debugger configuration	GDB_STUB_PORT	Configuration of Software debugger connection.

Target image file configuration

Configuration of file path of FM3 Simulator's image file is shown below.

Syntax

[GENERAL]
ELF_FILE=TargetImageFilePath

Section

GENERAL

EntryName

ELF_FILE

Value

TargetImageFilePath
Type：String（Default value：Sample image including simulator）

Remarks

Please assign ELF format file to this option.
This configuration cannot skip.

Example

ELF_FILE= Sample image including simulator

Software debugger configuration

Configuration of GdbStb port number, which is used in connection with software debugger, is shown below.

Syntax

[GENERAL]
GDB_STUB_PORT=GdbStubPort

Section

GENERAL

EntryName

GDB_STUB_PORT

Value

GdbStubPort
Type：Int（Default value：1234）

Remarks

If this option is disabled, software debugger is not connected.
This option is disabled in default.

Example

GDB_STUB_PORT=1234

2. Configurations of Microcontroller Function

The MCU function is configured by using MCU configuration file (micom.ini).

Configurations are shown at Table 4-2.

Table 4-2 Configuration list at microcontroller function

Option	Entry name	Explanation
PLL period configuration	PLL_CLK_PERIOD	Configuration of PLL clock period.

PLL clock period configuration

PLL clock period configuration is shown below.

Syntax

[GENERAL]
PLL_CLK_PERIOD=PllClockPeriod

Section

GENERAL

EntryName

PLL_CLK_PERIOD

Value

PllClockPeriod
Type：double（Default value：6944.4（ps）… Correspond to 144MHz）

Remarks

Please configure the value as 'ps' scale.

Example

PLL_CLK_PERIOD=6944.4

3. Configurations of Device Function

3-1. Configurations of Analog Input Function

Analog input function is configured by using analog input configuration file (analog_input.ini).

Configurations are shown at Table 4-3.

Table 4-3 Analog input function option

Option	Entry name	Explanation
Period of synchronization	SYNC_PERIOD	Period of synchronization, between FM3 Simulator and Analog input device.
Unit of synchronization period	TIME_UNIT	Unit of synchronization period, between FM3 Simulator and Analog input device.

Period of synchronization

Configuration of synchronization period, between FM3 Simulator and Analog input device, is shown below.

Syntax

[GENERAL]
SYNC_PERIOD=Value

Section

GENERAL

EntryName

SYNC_PERIOD

Value

Value
Type：unsigned int（Default value：1ms）

Remarks

If the period value which is smaller than configured CPU clock period, there is a possiblity that FM3 simulator can drop any analog input data. Therefore, please configure the period value bigger than CPU clock. Please refer 'TIME_UNIT' about the unit.

Example

SYNC_PERIOD=1

Unit of synchronization period

Configuration of synchronization period unit, between FM3 Simulator and Analog input device, is shown below.

Syntax

[GENERAL]
TIME_UNIT=unit

Section

GENERAL

EntryName

TIME_UNIT

Value

unit
Type：string（Default value：ms）

Remarks

If the period which smaller than CPU clock is configured, you have risk of lost input value from analog input GUI. Therefore, please configure the period which bigger than CPU clock. Please refer 'SYNC_PERIOD' about the period value.

Example

TIME_UNIT=ms

3-2. Configurations of DIP Switch Input Function

DIP switch input function is configured by using DIP switch input configuration file (dip_switch.ini).

Configurations are shown at Table 4-4.

Table 4-4 DIP switch function option

Option	Entry name	Explanation
Period of synchronization	SYNC_PERIOD	Period of synchronization, between FM3 Simulator and DIP switch input device.
Unit of synchronization period	TIME_UNIT	Unit of synchronization period, between FM3 Simulator and DIP switch input device.

Period of synchronization

Configuration of synchronization period, between FM3 Simulator and DIP switch input device, is shown below.

Syntax

```
[GENERAL]
SYNC_PERIOD=Value
```

Section

GENERAL

EntryName

SYNC_PERIOD

Value

Value
Type：int（Default value：1）

Remarks

If the period value which is smaller than configured CPU clock period, there is a possiblity that FM3 simulator can drop any input data from DIP Switch. Therefore, please configure the period value bigger than CPU clock. Please refer 'TIME_UNIT' about the unit.

Example

SYNC_PERIOD=1

Unit of synchronization period

Configuration of synchronization period unit, between FM3 Simulator and DIP switch input device, is shown below.

Syntax

```
[GENERAL]
TIME_UNIT=unit
```

Section

GENERAL

EntryName

TIME_UNIT

Value

unit
Type：string（Default value：ms）

Remarks

If the period value which is smaller than configured CPU clock period, there is a possiblity that FM3 simulator can drop any input data from DIP Switch. Therefore, please configure the period value bigger than CPU clock. Please refer 'SYNC_PERIOD' about the period value.

Example

TIME_UNIT=ms

3-3. Configurations of Tactile Switch Input Function

Tactile switch input function is configured by using Tactile switch input configuration file (tactile_switch.in). Configurations are shown at Table 4-5.

Table 4-5 Tactile switch function option

Option	Entry name	Explanation
Period of synchronization	SYNC_PERIOD	Period of synchronization, between FM3 Simulator and Tactile switch input device.
Unit of synchronization period	TIME_UNIT	Unit of synchronization period, between FM3 Simulator and Tactile switch input device.

Period of synchronization

Configuration of synchronization period, between FM3 Simulator and Tactile switch input device, is shown below.

Syntax

[GENERAL]
SYNC_PERIOD=Value

Section

GENERAL

EntryName

SYNC_PERIOD

Value

Value
Type：int（Default value：1）

Remarks

If the period value which is smaller than configured CPU clock period, there is a possiblity that FM3 simulator can drop any input data from Tactile Switch. Therefore, please configure the period value bigger than CPU clock. Please refer 'TIME_UNIT' about the unit.

Example

SYNC_PERIOD=1

Unit of synchronization period

Configuration of synchronization period unit, between FM3 Simulator and Tactile switch input device, is shown below.

Syntax

[GENERAL]
TIME_UNIT=unit

Section

GENERAL

EntryName

TIME_UNIT

Value

unit
Type：string（Default value：ms）

Remarks

If the period value which is smaller than configured CPU clock period, there is a possibility that FM3 simulator can drop any input data from Tactile Switch. Therefore, please configure the period value bigger than CPU clock. Please refer 'SYNC_PERIOD' about the period value.

Example

TIME_UNIT=ms

3-4. Configurations of Terminal Connection Function

Terminal connection function is configured by using terminal connection configuration file (termif_server.ini). Configurations are shown at Table 4-6.

Table 4-6 Terminal connection device function option

Option	Entry name	Explanation
Debug mode	DEBUG	Configuration of debug mode for Terminal connection device.
Host name	HOST	Configuration of Host name for Terminal connection device.
Port number	PORT	Configuration of Port number for terminal connection device.
Connection configuration	CONNECT	Configuration of connection (Disable/Enable) for Terminal connection device.

Debug mode

Configuration of debug mode for Terminal connection device is shown below.

Syntax

[GENERAL]
DEBUG=DebugMode

Section

GENERAL

EntryName

DEBUG

Value

DebugMode
Type：int（Default value：0）
0：Disenable
1：Enable（Debug message is shown under simulation running.）

Remarks

Example

DEBUG=0

Host name

Configuration of Host name for Terminal connection device is shown below.

Syntax

[NETWORK]
HOST= HostName

Section

NETWORK

EntryName

HOST

Value

HostName
Type：String（Default value：localhost）

Remarks

This configuration used for port connection with Terminal bridge.

Example

HOST=localhost

Port number

Configuration of Port number for terminal connection device is shown below.

Syntax

[NETWORK]
PORT=PortNumber

Section

NETWORK

EntryName

PORT

Value

PortNumber
Type：int（Default value：1204）

Remarks

This configuration used for port connection with Terminal bridge.

Example

PORT=1204

Connection configuration

Configuration of connection(Disable/Enable) for Terminal connection device is shown below.

Syntax

[NETWORK]
CONNECT=Connect

Section

NETWORK

EntryName

CONNECT

Value

Connect
Type：int（Default value：0）
0：Disable（Terminal program unconnected）
1：Enable（Terminal program connected）

Remarks

This configuration used for port connection with Terminal bridge.
Terminal connection bridge program is to be booted before boot the simulator when this configuration configure to 1.
Please configure 0 to this configuration when Terminal program does not connect.

Example

Connect=1

4. Configurations of Trace Function

4-1. Configurations of Trace Function

Trace function is configured by using Trace configuration file (svcd.ini). Configurations are shown at Table 4-7.

Table 4-7 Trace function configurations

Option	Entry name	Explanation
Trace file name	VCD_FILE	Configuration of Trace file name(.vcd) including file path.
Simulation unit time	TIME_UNIT	Configuration of simulation minimum unit time.

Trace file name

Configuration of Trace file name(.vcd), possible to add the file path, is shown below.

Syntax

[GENERAL]
VCD_FILE=file

Section

GENERAL

EntryName

VCD_FILE

Value

file
Type：String（Default value：..¥svcd.vcd）

Remarks

IF VCD_FILE setting is default value, the svcd.vcd is created in the VirtualStarterKit folder.

Example

VCD_FILE= svcd.vcd

Simulation minimum unit time

Configuration of simulation minimum unit time is shown below.

Syntax

[GENERAL]
TIME_UNIT=Value

Section

GENERAL

EntryName

TIME_UNIT

Value

Value
Type：int（Default value：ps）

Remarks

Example

TIME_UNIT=ps

4-2. Configurations for Selected Target Trace

Configurations for selected target trace are configured by using Trace select configuration file (trace.ini). Configurations are shown at Table 4-8.

Table 4-8 Configuration option which select target trace

Option	Entry name	Explanation
Trace ON/OFF	TracePortName	Target trace signal name is configured as EntryName and ON/OFF is configured as the Value.

Trace ON/OFF

Target trace signal name is configured as EntryName and ON/OFF is configured Value.

The example is shown below.

Syntax

[GENERAL]
TracePortName=ON/OFF

Section

GENERAL

EntryName

TracePortName
Type：String（Target trace signal name)

Value

on/off
Type：String（Default value：OFF）

Remarks

Example

[GENERAL]
P00=ON
SOT1=OFF

Selectable port as TracePortName is shown at 'Table 5-3 Traceable I/O port list' at 'CHAPTER5: Simulation Data Analyzing'.

5. How to Run Simulation

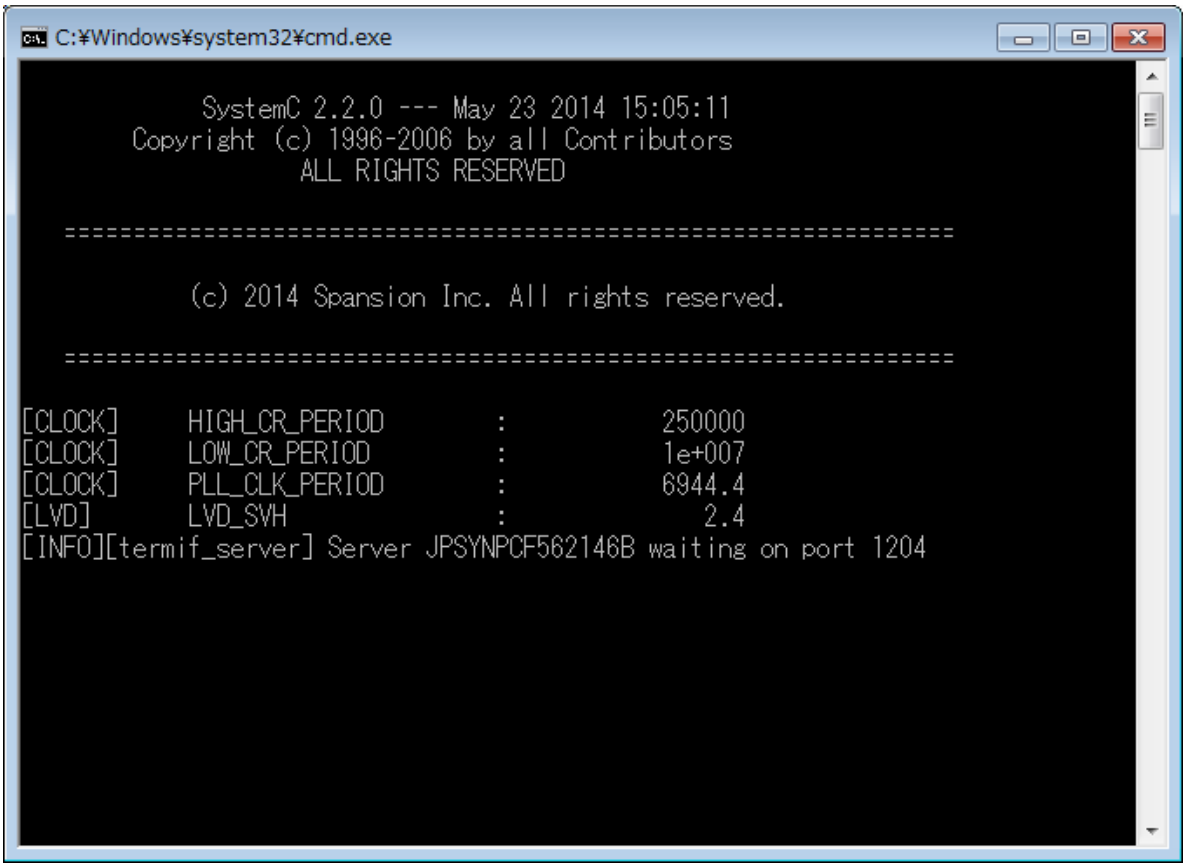
To run the simulation, execute the batch file VirtualStarterKit.bat.

If the simulation runs properly, the simulator will wait to connect a Terminal Program as shown in Figure 4-1.

Connect a Terminal Program to the Terminal Connection Device of the simulator.

Refer to sub section 3-4 for the Terminal Connection setting.

Figure 4-1 Simulator running window

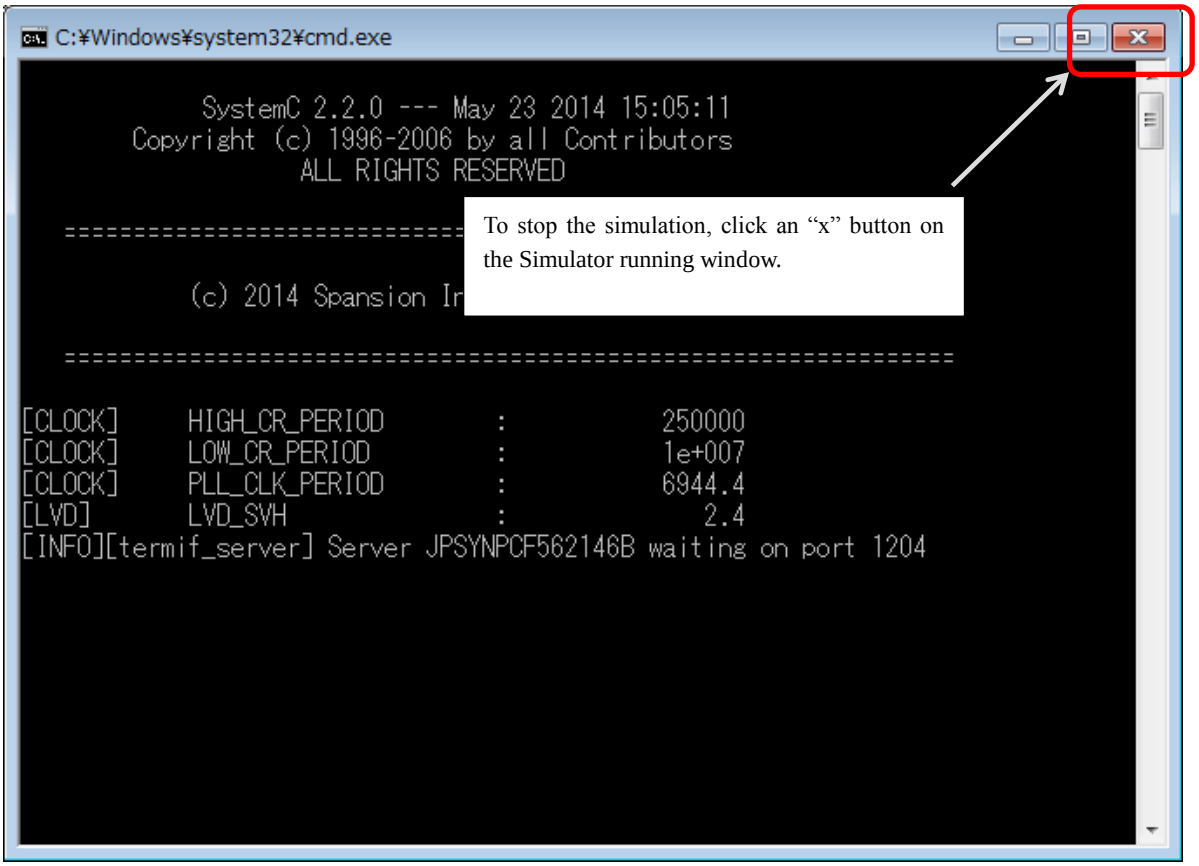


6. How to Stop Simulation

To stop the simulation, click an “x” button on the Simulator running window.

If the Debugger connects to simulator, please disconnect it before stop simulation.

Figure 4-2 Stop Simulation



CHAPTER5: Simulation Data Analyzing

This chapter explains the functions of the Simulation Data Analyzing.

---

1. Overview

FM3 Simulator has I/O trace function to trace the value of a I/O signal.

Trace function option configuration is necessary for I/O trace function before the simulation run. (See also '4-5. Option configuration of Trace function')

VCD format trace file is output to a trace file after simulation run finishes when any signal becomes a target to be traced.

If you use Trace function you can analyze simulation data.

2. Trace Type

Trace function is divided into two types, depending on target trace port data type. Two types are shown below.

- Signal type
- Transaction type

Signal type

Signal type port is used for port of signal level.

In case of selecting signal type port as target trace, items which is outputted in trace file(.vcd) are shown at Table 5-1.

Table 5-1 Items which are outputted in trace file at signal type

Items	Explanation
ContentID	Data type ID of selected port as target trace.
Data	Communication data of selected port as target trace.

Transaction type

Transaction type port is used for port including multiple signals in one-transaction.

In case of selecting transaction type port as target trace, items which is outputted in trace file(.vcd) are shown at Table 5-2.

Table 5-2 Items which is outputted in trace file at transaction type

Items	Explanation
ContentID	Data type ID which selected as trace target port conducting.
Mode	Communication mode of selected port as target trace. (*1)
Command	Transaction handling which write/read to communication data. (WRITE, READ)
Address	Transaction destination address (*2).
Length	Communication data length (byte).
Data	Communication data of selected port as target trace.
Response	Transaction response status.

*1: Items which are outputted only Multifunction serial.
*2: Items which are outputted only External Bus Interface.

3. Target Trace

Traceable I/O port list on FM3 Simulator is shown at Table 5-3.

Table 5-3 Traceable I/O port list

Including Function		Tracetype
Power	VCC	Signal
Clock	X0	Signal
	X0A	Signal
Reset	INITX	Signal
External interrput・NMI control	INT00-INT07	Signal
	INT08-INT15	Signal
	NMIX	Signal
I/O port	P00-P07	Signal
	P00-P0F	Signal
	P10-P1F	Signal
	P20-P2F	Signal
	P30-P3F	Signal
	P40-P4F	Signal
	P50-P5F	Signal
	P60-P6F	Signal
	P70-P7F	Signal
	P80-P8F	Signal
	P90-P9F	Signal
	PA0-PAF	Signal
	PB0-PBF	Signal
	PC0-PCF	Signal
	PD0-PDF	Signal
	PE0-PEF	Signal
	PF0-PFF	Signal
External bus interface	EXT_master	Transaction
A/D converter	ADTG0-ADTG2	Signal
	AN00	Signal
	AN01-AN15	Signal
	AVCC	Signal
	AVRH	Signal
	AVSS	Signal
Base Timer	TIOA0-TIOA7	Signal
	TIOB0-TIOB7	Signal
Multifunction Timer	FRCK0-FRCK2	Signal
	IC00-IC03	Signal
	IC10-IC13	Signal
	IC20-IC23	Signal
	RTO00-RTO05	Signal
	RTO10-RTO15	Signal
	RTO20-RTO25	Signal

4. Trace Result Visualization

Trace result is output to trace file under VCD format. The user can visualize trace result, by using a waveform view supporting VCD format file.

Wave form viewer

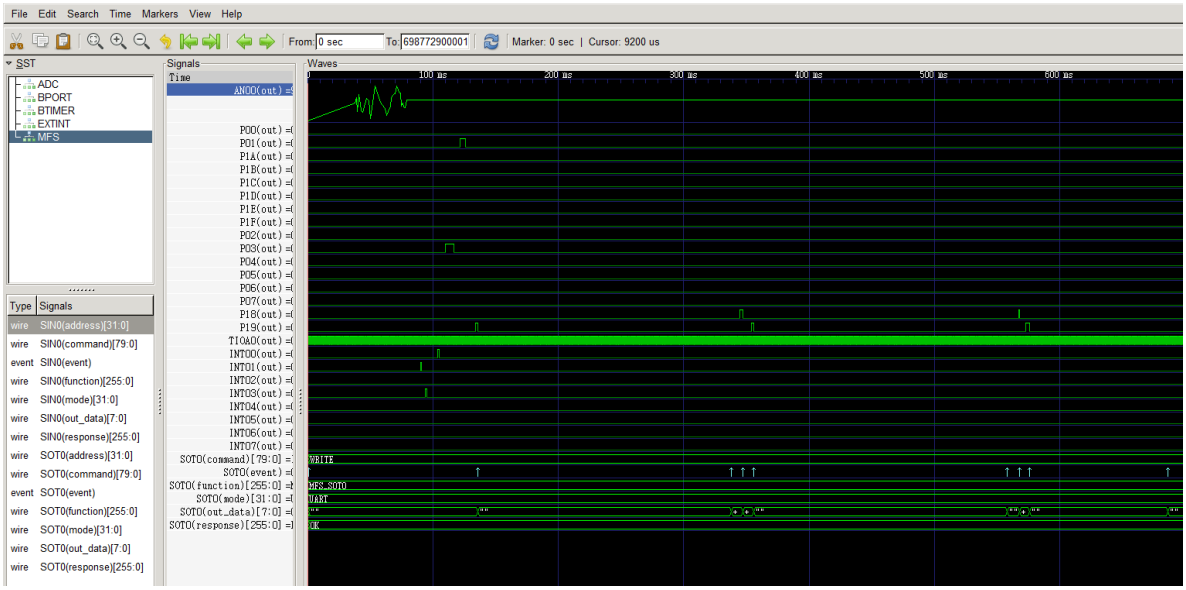
Tool：GTKWave

Source：http://gtkwave.sourceforge.net/

The wave form viewer can conduct VCD format file. The viewer is free of charge.

Example view of trace result at GTKWave is shown at Figure 5-1.

Figure 5-1 Example view of trace result at GTKWave



Note:

1. *ContentID, Mode, Command and Response are outputted trace file with ASCII code.*
2. *You can check the trace result as character, if you display data format change to ASCII on the viewer, when the trace result is displayed on the waveform viewer.*

MAJOR CHANGES

Page	Section	Changes
Revision 1.0		
-	-	Initial release

MN706-00044-1v0-E

Spansion・Controller Manual

FM3 Family
32-BIT MICROCONTROLLER
Virtual Starter Kit User Manual

July 2014 Rev. 1.0

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